

Claims

1. A hydrogas suspension unit for acting on a leading or trailing suspension arm
5 connected between the suspension unit and a vehicle road wheel, the suspension unit including:
 - a support for mounting on the vehicle,
 - 10 pivot means for pivotally mounting the suspension arm on the support,
 - a pair of associated hydrogas units mounted on the support, namely a first hydrogas unit and a second hydrogas unit,
 - 15 each of said first hydrogas unit and second hydrogas unit being operably connected to the pivot means to resist pivotal movement of said pivot means in opposite directions.
2. A suspension unit as claimed in claim 1 wherein each hydrogas unit has a
20 gas cylinder and an associated oil cylinder,
 - said gas cylinder having a separator piston slidably mounted therein and dividing the gas cylinder into a gas chamber and an oil chamber,
 - 25 said oil cylinder having a plunger piston slidably mounted within the oil cylinder and defining therewith an oil chamber of variable volume,
 - the oil chamber of the oil cylinder communicating with the oil chamber of the gas cylinder via a damper which is operable to regulate the flow
30 of oil between the oil cylinder and the gas cylinder,
 - the plunger piston being connected by a connecting rod to a crankshaft which forms the pivot means,

said crankshaft being rotatably mounted on the support,

said crankshaft having means for connection to the suspension arm,

5 the connecting rods of the first hydrogas unit and the second hydrogas unit being connected to the crankshaft such that the first hydrogas unit and the second hydrogas unit resist rotation of the crankshaft in opposite directions.

10 3. A suspension unit as claimed in claim 1 wherein said first and second hydrogas units are of the same capacity.

4. A suspension unit as claimed in claim 1 wherein said first and second hydrogas units are of different capacity.

15 5. A suspension unit as claimed in claim 1 wherein the first hydrogas unit and the second hydrogas unit each have oil cylinders which are interconnected and means is provided for transferring oil between said oil cylinders of the first and second hydrogas units.

20 6. A suspension unit as claimed in claim 1 wherein said first and second hydrogas units are arranged in an opposed configuration projecting outwardly at opposite sides of the support.

25 7. A suspension unit as claimed in claim 1 wherein said first and second hydrogas units are mounted in a juxtaposed position on the support.

8. A suspension unit as claimed in claim 7 wherein said first and second hydrogas units are mounted in a substantially horizontal orientation on the support.

30 9. A hydrogas suspension unit for acting on a leading or trailing suspension arm connected between the suspension unit and a vehicle road wheel, the suspension unit including:

- a support for mounting on the vehicle,
pivot means for pivotally mounting the suspension arm on the support,
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a pair of associated hydrogas units mounted on the support, namely a first hydrogas unit and a second hydrogas unit,
each of said first hydrogas unit and second hydrogas unit being operably connected to the pivot means to resist pivotal movement of said pivot means in opposite directions,
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each hydrogas unit having a gas cylinder and an associated oil cylinder,
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said gas cylinder having a separator piston slidably mounted therein and dividing the gas cylinder into a gas chamber and an oil chamber,
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said oil cylinder having a plunger piston slidably mounted within the oil cylinder and defining therewith an oil chamber of variable volume,
the oil chamber of the oil cylinder communicating with the oil chamber of the gas cylinder via a damper which is operable to regulate the flow of oil between the oil cylinder and the gas cylinder,
25
the plunger piston being connected by a connecting rod to a crankshaft which forms the pivot means,
said crankshaft being rotatably mounted on the support,
30
said crankshaft having means for connection to the suspension arm,
the connecting rods of the first hydrogas unit and the second hydrogas unit being connected to the crankshaft such that the first

hydrogas unit and the second hydrogas unit resist rotation of the crankshaft in opposite directions.

10. A suspension unit as claimed in claim 9 wherein said first and second hydrogas units are of the same capacity.
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11. A suspension unit as claimed in claim 9 wherein said first and second hydrogas units are of different capacity.
- 10 12. A suspension unit as claimed in claim 9 wherein the first hydrogas unit and the second hydrogas unit each have oil cylinders which are interconnected and means is provided for transferring oil between said oil cylinders of the first and second hydrogas units.
- 15 13. A suspension unit as claimed in claim 9 wherein said first and second hydrogas units are arranged in an opposed configuration projecting outwardly at opposite sides of the support.
14. A suspension unit as claimed in claim 9 wherein said first and second hydrogas units are mounted in a juxtaposed position on the support.
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15. A suspension unit as claimed in claim 14 wherein said first and second hydrogas units are mounted in a substantially horizontal orientation on the support.
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16. A hydrogas suspension unit for acting on a leading or trailing suspension arm connected between the suspension unit and a vehicle road wheel, the suspension unit including:
 - 30 a support for mounting on the vehicle,
 - pivot means for pivotally mounting the suspension arm on the support,
 - a pair of associated hydrogas units mounted on the support, namely a

- first hydrogas unit and a second hydrogas unit,
each of said first hydrogas unit and second hydrogas unit being
operably connected to the pivot means to resist pivotal movement of
said pivot means in opposite directions,
- 5 each hydrogas unit having a gas cylinder and an associated oil
cylinder,
10 said gas cylinder having a separator piston slidably mounted therein
and dividing the gas cylinder into a gas chamber and an oil chamber,
said oil cylinder having a plunger piston slidably mounted within the oil
cylinder and defining therewith an oil chamber of variable volume,
15 the oil chamber of the oil cylinder communicating with the oil chamber
of the gas cylinder via a damper which is operable to regulate the flow
of oil between the oil cylinder and the gas cylinder,
20 the plunger piston being connected by a connecting rod to a
crankshaft which forms the pivot means,
said crankshaft being rotatably mounted on the support,
25 said crankshaft having means for connection to the suspension arm,
the connecting rods of the first hydrogas unit and the second
hydrogas unit being connected to the crankshaft such that the first
hydrogas unit and the second hydrogas unit resist rotation of the
30 crankshaft in opposite directions,
said first and second hydrogas units being of the same capacity,

17. A hydrogas suspension unit for acting on a leading or trailing suspension arm

connected between the suspension unit and a vehicle road wheel, the suspension unit including:

a support for mounting on the vehicle,

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pivot means for pivotally mounting the suspension arm on the support,

a pair of associated hydrogas units mounted on the support, namely a first hydrogas unit and a second hydrogas unit,

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each of said first hydrogas unit and second hydrogas unit being operably connected to the pivot means to resist pivotal movement of said pivot means in opposite directions,

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each hydrogas unit having a gas cylinder and an associated oil cylinder,

said gas cylinder having a separator piston slidably mounted therein and dividing the gas cylinder into a gas chamber and an oil chamber,

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said oil cylinder having a plunger piston slidably mounted within the oil cylinder and defining therewith an oil chamber of variable volume,

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the oil chamber of the oil cylinder communicating with the oil chamber of the gas cylinder via a damper which is operable to regulate the flow of oil between the oil cylinder and the gas cylinder,

the plunger piston being connected by a connecting rod to a crankshaft which forms the pivot means,

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said crankshaft being rotatably mounted on the support,

said crankshaft having means for connection to the suspension arm,

the connecting rods of the first hydrogas unit and the second hydrogas unit being connected to the crankshaft such that the first hydrogas unit and the second hydrogas unit resist rotation of the crankshaft in opposite directions,

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said first and second hydrogas units being of different capacity.

18. A hydrogas suspension unit for acting on a leading or trailing suspension arm connected between the suspension unit and a vehicle road wheel, the
10 suspension unit including:

a support for mounting on the vehicle,

15 pivot means for pivotally mounting the suspension arm on the support,
a pair of associated hydrogas units mounted on the support, namely a
first hydrogas unit and a second hydrogas unit,

20 each of said first hydrogas unit and second hydrogas unit being
operably connected to the pivot means to resist pivotal movement of
said pivot means in opposite directions,

each hydrogas unit having a gas cylinder and an associated oil
cylinder,

25 said gas cylinder having a separator piston slidably mounted therein
and dividing the gas cylinder into a gas chamber and an oil chamber,

30 said oil cylinder having a plunger piston slidably mounted within the oil
cylinder and defining therewith an oil chamber of variable volume,

the oil chamber of the oil cylinder communicating with the oil chamber
of the gas cylinder via a damper which is operable to regulate the flow
of oil between the oil cylinder and the gas cylinder,

the plunger piston being connected by a connecting rod to a crankshaft which forms the pivot means,

5 said crankshaft being rotatably mounted on the support,

 said crankshaft having means for connection to the suspension arm,

10 the connecting rods of the first hydrogas unit and the second hydrogas unit being connected to the crankshaft such that the first hydrogas unit and the second hydrogas unit resist rotation of the crankshaft in opposite directions,

15 the first hydrogas unit and the second hydrogas unit each have oil cylinders which are interconnected and means is provided for transferring oil between said oil cylinders of the first and second hydrogas units.

19. A hydrogas suspension unit for acting on a leading or trailing suspension arm
20 connected between the suspension unit and a vehicle road wheel, the suspension unit including:

 a support for mounting on the vehicle,

25 pivot means for pivotally mounting the suspension arm on the support,

 a pair of associated hydrogas units mounted on the support, namely a first hydrogas unit and a second hydrogas unit,

30 each of said first hydrogas unit and second hydrogas unit being operably connected to the pivot means to resist pivotal movement of said pivot means in opposite directions,

 each hydrogas unit having a gas cylinder and an associated oil

cylinder,

said gas cylinder having a separator piston slidably mounted therein and dividing the gas cylinder into a gas chamber and an oil chamber,

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said oil cylinder having a plunger piston slidably mounted within the oil cylinder and defining therewith an oil chamber of variable volume,

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the oil chamber of the oil cylinder communicating with the oil chamber of the gas cylinder via a damper which is operable to regulate the flow of oil between the oil cylinder and the gas cylinder,

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the plunger piston being connected by a connecting rod to a crankshaft which forms the pivot means,

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said crankshaft being rotatably mounted on the support,

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said crankshaft having means for connection to the suspension arm,

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the connecting rods of the first hydrogas unit and the second hydrogas unit being connected to the crankshaft such that the first hydrogas unit and the second hydrogas unit resist rotation of the crankshaft in opposite directions,

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said first and second hydrogas units being mounted in a juxtaposed position on the support.

20. A trailing arm suspension assembly for a vehicle including:

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a support for mounting on the vehicle,

pivot means for pivotally mounting a suspension arm on the support,

a pair of associated hydrogas units mounted on the support, namely a

- first hydrogas unit and a second hydrogas unit,
each of said first hydrogas unit and second hydrogas unit being
operably connected to the pivot means to resist pivotal movement of
said pivot means in opposite directions,
each hydrogas unit having a gas cylinder and an associated oil
cylinder,
10 said gas cylinder having a separator piston slidably mounted therein
and dividing the gas cylinder into a gas chamber and an oil chamber,
said oil cylinder having a plunger piston slidably mounted within the oil
cylinder and defining therewith an oil chamber of variable volume,
15 the oil chamber of the oil cylinder communicating with the oil chamber
of the gas cylinder via a damper which is operable to regulate the flow
of oil between the oil cylinder and the gas cylinder,
20 the plunger piston being connected by a connecting rod to a
crankshaft which forms the pivot means,
said crankshaft being rotatably mounted on the support,
25 said crankshaft having means for connection to the suspension arm,
the connecting rods of the first hydrogas unit and the second
hydrogas unit being connected to the crankshaft such that the first
hydrogas unit and the second hydrogas unit resist rotation of the
30 crankshaft in opposite directions,